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TITLE: METHOD OF GENERATING A DIGITAL ITEM DATA STRUCTURE FOR ELECTRONIC COMMERCE ACTIVITIES

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METHOD OF GENERATING DIGITAL ITEM DATA STRUCTURE FOR ELECTRONIC COMMERCE ACTIVITIES

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001]   The present invention relates to generating a digital item data structure as a unit of manipulation of multimedia data for electronic commerce activities, such as creation, mining, transaction, transfer, management, storage, consumption, etc., of multimedia data.

2. Background of the Related Art

[0002]   The present invention defines "digital item" as a data structure configured to function as a unit of manipulation of multimedia data for electronic commerce activities. More particularly, the present invention defines "digital item" as the unit of manipulation of multimedia data in creation, mining, transaction, transfer, management, storage, consumption, etc., of multimedia data for electronic commerce activities.

[0003]   For performing activities associated with electronic commerce, including creation, mining, transaction, transfer, management, storage, consumption, etc., of multimedia data, there arises a need for flexibility, consistency, and compatibility in connection with the unit of manipulation of multimedia data. Particularly, in light of the increase in electronic commerce activities due to the development of the Internet, the absence of a model defining a unit of manipulation of multimedia data for electronic commerce activities can result in disturbances in electronic commerce activities.

[0004] According to this, considering the role of relations among all Users (referring to all users associated with business models of the electronic commerce environment, such as creators, providers, distributors, consumers, intellectual property exercisers, industrial property exercisers, financial service provider, electronic commercial transaction supervisors, etc.), the MPEG-21 standard, ISO/IEC SC29/WG11 identifies a digital item definition model and efforts have been made to adopt an international standard according to which digital items have flexibility, consistency, and compatibility based on electronic commerce activities or the association with other MPEG-21 multimedia framework element technologies.

[0005] Accordingly, considering the issues for building business models for the electronic commerce activities or the association with the other MPEG-21 multimedia framework element technologies, it is necessary to provide a digital item definition model so that electronic commerce activities can be accomplished regardless of various types of network and terminal environments. Such a digital item definition model is required to have compatibility, consistency, and flexibility as the unit of manipulation of multimedia data in electronic commerce activities, including creation, mining, transaction, transfer, management, storage, consumption, etc., of multimedia data required in the electronic commerce environment.

SUMMARY OF THE INVENTION

[0006] Accordingly, the present invention provides a digital item definition model with flexibility, consistency, and compatibility as is required in the electronic commerce environment including different subjects (Users), networks, terminals, etc.

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[0007] More particularly, the present invention provides a digital item definition model with flexibility, consistency, and compatibility and a method of generating the same, which is capable of minimizing a possible disturbance in the electronic commerce activities among all the subjects associated with electronic commerce Users - electronic commerce business model and accomplishing under a consistent rule a compatible electronic commerce activities for multimedia data among all the subjects associated with the electronic commerce business model.

[0008] The present invention provides a method of generating a digital item data structure for electronic commerce activities comprising selecting resources for the electronic commerce activities of multimedia data; and generating a digital item data structure as the unit of manipulation of electronic commerce activities for the corresponding multimedia resources defined by including an anchor, descriptor, opCondition, murCondition, eventReport, userPreference, and reservedMetadata.

[0009] Preferably, the digital item data structure includes a lowest atomic digital item data structure which is not further divided and a packaged digital item data structure with each item configuring a recurrent layered data structure for each level.

[0010] Preferably, the packaged digital item data structure is defined to include the atomic digital item data structure and/or sub packaged digital item data structure or anchor for designating them.

[0011] Preferably, in order to configure the recurrent layered data structure, the atomic digital item data structure as the lowest layer is defined as a **component**, the packaged digital item data structure as the middle layer including the component or any sub

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packaged digital item data structure or information (anchor) for designating them is defined as an **item**, and the packaged digital item data structure as the highest layer including item or any sub container or information (anchor) for designating them is defined as a **container**.

[0012]   Preferably, when the digital item data structure is configured as a recurrent layered data structure, the higher level of packaged digital item data structure is defined to include both a syntactically same level of the packaged digital item data structure and the lower level of an item or including the anchor for designating the digital item data structure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]   The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

[0014]   Fig. 1 is a block diagram showing a data structure of a digital item definition model according to the present invention;

[0015]   Fig. 2 is a block diagram showing one example of component elements of a digital item data structure according to the present invention; and

[0016]   Fig. 3 is a view representing a digital item definition model according to the present invention expressed using EBNF (Extended Backus-Naur Form).

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0017] Hereinafter, a method of generating a digital item data structure for electronic commerce activities according to the present invention will be described in detail with respect to the accompanied drawings.

[0018] Fig. 1 is a block diagram showing a data structure of a digital item definition model according to the present invention. As shown in Fig. 1, digital item data structures of the present invention are basically divided into atomic digital item data structures and packaged digital item data structures.

[0019] The atomic digital item is a basic digital item data structure that is not further divided. The packaged digital item is a data structure which may include an atomic digital item or any sub-packaged digital item or anchors designating each of the digital items. Although the packaged digital item has a recurrent layered data structure, it can be extended over two levels schematically and the number of the recurrence has no limitation.

[0020] As shown in Fig. 1, the digital item definition model can be defined by three levels of layered data structure, with a **container** as the highest level, an **item** as the middle level, and a **component** as the lowest level, in consideration of practical use. Referring to Fig. 1, the data structure of the digital item definition model of the present invention will be described below.

[0021] Digital item 100 consists of content 100a and metadata 100b. A digital item of the lowest layer, which is not divided further, is defined as atomic digital item 101 in the present invention. Atomic digital item 101 consists of atomic content 101a and metadata

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101b. The content 101a corresponds to a multimedia resource and metadata 101b corresponds to data for describing the multimedia resource.

[0022] The component 102 which is defined to include content 101a and metadata 101b consists of the lowest layer in the recurrent layered data structure which will be described below, and will be used as data of a minimal unit in a digital item configuration. The component 102 is defined to include the following elements: a multimedia resource 102a, such as audio, video, image, and graphic data, an anchor 102b designating the resource, a descriptor 102c, an opCondition 102d, a murCondition 102e, an eventReport 102f, a userPreference 102g, and a reservedMetadata 102h.

[0023] The anchor 102b at the component level designates atomic resource 102a and is defined as an identifier designating a uniquely atomic resource, a descriptor describing what this particular anchor is, and an opCondition capable of describing usage format (or protocol) of the anchor. Namely, the anchor 102a is meant to include a reference, a descriptor, and an opCondition.

[0024] In addition, the descriptor 102c at the component level is a description of details of the resource 102a, the opCondition 102d is a description of operational use conditions of the resource 102a, and the murCondition 102e is a description of conditions for management and use rule. Further, the eventReport 102f is a description of an event to be reported in connection with resource 201b and the userPreference 102g has user preference information on the resource 201a. Furthermore, the reservedMetadata 102h at the component level is an element for defining metadata additionally required for the digital item definition model in the future.

[0025]   Fig. 2 is a block diagram showing one example of component elements of a digital item definition model according to the present invention. Referring to exemplary use of component elements of Fig. 2, detailed description will be given below.

[0026]   Referring to component element definition 200a and a content 200b represented by component element 200a as shown in Fig. 2, resource 201a is the file Kenny G_White Christmas.mp3 201b and an identifier of anchor 202a is URL 202b designating the resource. As shown in Fig. 2, descriptor 203a is a description 203b of the content (title, type, writer, performer, etc.) of resource 201a. In addition, murCondition 204a is a description of conditions 204b for management and use rule (update date, use rule, usage fee...) of resource 201a and opCondition 205a is a description of operational conditions 205b, such as transmission rate and sampling rate. Additionally, eventReport 206a is a description of an event 206b, such as a transaction success rate, access frequency, and average delivery time to be reported in connection with the resource, and userPreference 207a has information related to user preference and the like on the resource.

[0027]   Referring again to Fig. 1, component 102, which is an atomic digital item as the unit of manipulation according to the present invention as described above, includes the multimedia resource 102a, the anchor 102b for designating the resource, the descriptor 102c for describing the content of the resource, the opCondition 102d for describing operational use conditions of the resource, the murCondition 102e for describing conditions related to commercial management and use rule for the resource, the eventReport 102f for describing an event to be reported in connection with the resource, the userPreference 102g having user preference information 102g, and the reservedMetadata 102h additionally required for a

future digital item definition model. The component 102 configured as described above allows unified, consistent, and flexible manipulation among the subjects of electronic commercial transactions with minimal manipulation of digital multimedia data in activities related to the electronic commercial transactions.

[0028]   The component of the present invention is placed on the lowest layer when a digital item definition model having a layered data structure and packaged digital items are defined in layers from a highest to lowest layers. Fig. 1 shows a digital item definition model formed of three levels of layered data structure, with an **item** being a packaged digital item formed as a combination of items and components, and a **container** being a packaged digital item formed as a combination of items and containers.

[0029]   The packaged digital item 103 is the middle layer of the three levels of the digital item definition model and consists of packaged content 103a and metadata 103b. It is defined as item 104 in the present invention. In addition, the packaged digital item 105 is the highest layer in the three levels of the digital item definition model and consists of packaged content 105a and metadata 105b. It is defined as container 106 in the present invention.

[0030]   First, item 104 in the digital item definition model includes a component or other items 104a as packaged content, a choice 104b, a descriptor 104c, a murCondition 104d, an eventReport 104e, a userPreference 104f, and a reservedMetadata 104g. The packaged content 104a can include a component, all of the other items, or an anchor for designating the component or items. The choice 104b is defined to include a recurrent choice, a descriptor, an opCondition, and a selection as the object of option. The choice

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104b is used for an item 104 level required for selective configuration satisfying a request of a user of a digital item. Since the user generally configures the item through multiple steps so that a layered definition of choice is required, this choice is modeled in a recurrent form.

[0031] The descriptor 104c describes the content of the packaged content 104a and the murCondition 104d describes the conditions related to management and use rule of the packaged content 104a. The eventReport 104e is a description of an event to be reported in connection with the packaged content 104a, the userPreference 104f describes information on user preference for the packaged content 104a, and the reservedMetadata 104g is an element for defining metadata additionally required for a future digital item definition model. Since item 104 with the structure as described above can be connected again recurrently to the higher layer of container 106, item 104 can be used to configure a layered data structure of the digital item definition model.

[0032] The container 106 defined as the highest layer in the three levels of the digital item definition model of Fig. 1 will be now described. The container 106 includes container 106a or an anchor for designating the container 106a, and an item 106b or an anchor for designating the item 106b. Also, the container 106 includes a descriptor 106c for describing packaged content 106a and 106b, a murCondition 106d for describing management and use rule for packaged content 106a and 106b, an eventReport 106e for describing an event to be reported in connection with packaged content 106a and 106b, a userPreference 106f for packaged content 106a and 106b, and a reservedMetadata 106g for defining metadata additionally required for a future digital item definition model.

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[0033] Component 102, item 104, and container 106 can be stored in a repository 107 along with corresponding multimedia resources. According to the digital item definition model as shown in Fig. 1, the subjects of electronic commercial transaction can perform activities associated with electronic commercial transaction, including creation, mining, transaction, transfer, management, storage, consumption, etc., of multimedia data, with consistency, regularity and flexibility.

[0034] Fig. 3 shows a more detailed linguistic representation of the three levels of the digital item definition model with recurrent and layered data structure as illustrated in Fig. 1, using EBNF (Extended Backus-Naur Form). The digital item definition model according to the present invention as shown in Fig. 3 shows details for the digital item data structure of the present invention illustrated in Figs. 1 and 2 in an implicit way. The following terms, i.e., descriptor, choice, murCondition, opCondition, eventReport, userPreference, and reservedMetadata, have the same meaning as those described in Figs. 1 and 2.

[0035] In Fig. 3, '*' means at least zero (0) or more, '+' means at least one (1) or more, and ' | ' means 'OR' logical operation. As represented in Fig. 3, container 106 which is the highest layer of digital item in the present invention includes the following elements:

1. at least zero (0) or more container 106a or anchor for designating the container 106a.

2. at least zero (0) or more item 106b or anchor for designating the lower level of the item 106b.

3. at least zero (0) or more descriptor 106c, murCondition 106d, eventReport 106e, userPreference 106f, and reservedMetadata 106g.

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[0036]   Item 104 which is a level lower than that of container includes the following

elements:

1.   at least one (1) or more component or item 104a or anchors for designating

the component or item 104a.

2.   at least zero (0) or more choice 104b, descriptor 104c, murCondition 104d,

eventReport 104e, userPreference 104f, and reservedMetadata 104g.

[0037]   In addition, component 102 which is an atomic digital item or a level lower

than that of item 104 includes the following elements:

1.   atomic resource 102a, and an anchor 102b for designating the resource.

2.   at least zero (0) or more descriptor 102c, opCondition 102d, murCondition

102e, eventReport 102f, userPreference 102g, and reservedMetadata 102h.

[0038]   Here, the resource is multimedia data such as audio, video, image, text,

graphic, etc.

[0039]   In a digital item of the component level, opCondition 102d which is

operational use conditions of the component is modeled unlike the digital items of other

levels. Since a component corresponds to an atomic digital item or a part of a container of

digital items and succeeds to the definition of higher levels of digital item, opCondition

needs not to be defined separately in the levels higher than that of component.

[0040]   The anchor 102b at the component level designates a multimedia resource.

Also, since the higher level of packaged digital item at the item or container level can include

both a syntactically same level of packaged digital item and a lower level of item or can

include an anchor for designating such items, the higher level of anchors 104a, 106a, and

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106b as described above can designate a digital item required to define each of the digital items at the item or container level. Accordingly, in light of Fig. 3, an anchor is defined to include a reference being an identifier for designating a uniquely atomic resource and each of the digital items, at least zero (0) or more descriptor (describing what this anchor is), and at least zero (0) or more opCondition capable of describing usage format (or protocol) of anchor.

[0041]   The descriptor (102c, 104c, 106c, etc.) used in all of the levels of digital items (component, item, container, etc.) as described above is defined to include at least zero(0) or more existing descriptor or anchor, a component capable of representing the content of the descriptor or a statement of text format for describing the content of descriptor to be defined, and at least zero (0) or more opCondition (for example, representation format) of the descriptor.

[0042]   The choice is used only in the item level of the digital item definition model and is defined in the recurrent form of at least zero (0) or more choice, at least zero (0) or more descriptor, at least zero (0) or more opCondition, and at least one (1) or more selection in order to determine proper item (104). The choice is used for the item level for the purpose of selective item configuration in order to adapt the digital item according to various types of networks and terminals, or to a user request. Since the user generally can configure an item through multiple steps, a layered definition of choice is required. This choice is modeled in a recurrent form. Also, opCondition in choice can be used to determine whether a single selection is selected (i.e., exclusive) or more than one selection is selected (i.e., inclusive). Here, selection as an element for constituting the choice is defined

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to include a predicate as Boolean function representation language, at least zero (0) or more descriptor for describing the selection, and at least zero (0) or more opCondition for describing operational use conditions (for example, switching function such as use or not use for selection itself) for the selection.

[0043]   In the meantime, an eventReport defined for event reporting, which is one of important multimedia framework technologies of MPEG-21, is required in order to provide information on events (or actions) that can be generated by interaction of User and the digital item. This information is used to evaluate and supervise general performance of digital item usage in the MPEG-21 multimedia framework. Accordingly, an eventReport in the digital item definition model of the present invention is defined to include an anchor for designating a server computer for processing, managing and storing the reportable event content, a descriptor for describing the content of event report, and a murCondition for describing conditions related to the management and use rule of the event report content.

[0044]   In addition, a userPreference required for providing information satisfying the desire of a consumer who is an end user of the digital item can provide customized information based on the result of the event report or personal user preference. The userPreference is defined to an include an anchor for designating the existing user preference information, a descriptor for describing the content of the user preference information, and a murCondition for describing management and use rule of the user preference information.

[0045]   The reservedMetadata is defined to include an anchor, a descriptor, and a murCondition in the same manner as the eventReport and the userPreference. Since the

reservedMetadata is defined for the purpose of reservation for extension of the digital item metadata model, this may be not used if desired.

[0046]   A murCondition is an element required for defining a container, an item, a component, an eventReport, a userPreference, and a reservedMetadata. The murCondition defines conditions for management and use rule of the digital items or elements of the digital item definition model to be defined, for example, a content access authority list, recently updated data, usage fee and conditions of the digital item. The murCondition is defined using at least one (1) or more predicate which is Boolean function representation language.

[0047]   In addition, the opCondition for defining operational use conditions of the digital item is optionally required for component 102, anchor, descriptor, choice and selection in the digital item definition model. The opCondition defines the operational use conditions by use of at least one (1) or more predicate which is Boolean function representation language in the same manner as the murCondition. In the case of a digital item of the component level, opCondition includes a transmission bit rate, a resolution of the video or image, a sampling rate of the audio, a compression algorithm, a key or decoding conditions if coded, a transmission protocol, etc.

[0048]   As described above, the present invention provides a digital item definition model with flexibility, consistency, and compatibility, considering at its maximum all the Users of electronic commerce activities in the business model and interrelation between primary technologies of the MPEG-21 multimedia framework and digital item definition model. For example, for the objective and role of monitoring service providers of the electronic commerce business model, the digital item definition model includes the

eventReport defined for event reporting which is one of the primary technologies of the MPEG-21 multimedia framework and the userPreference required for providing information in order to satisfy the desire of a consumer who can be an end user of the digital item.

[0049]   In addition, the present invention provides a model related to multi-conditions, which is divided into various conditions depending on the objective, as well as one conditions when conditions related to operation, management, use, and manipulation of the digital item. For example, the operational conditions (for example, conditions for transmission bit rate, resolution, format, etc. of the digital item) of the digital item is modeled as opCondition and management and use conditions (for example, change history, use fee, use conditions) is modeled as the murCondition, so that facility of management and maintenance can be improved at the time of use, management, and manipulation according to the definition of the digital item.

[0050]   In addition, when a digital item is defined in the present invention, facility of management and maintenance can be improved by employing an anchor referencing the existing digital item as well as a definition or description of the metadata. Namely, the present invention provides a model capable of giving a unique identifier to each level of digital item and descriptor. For example, each digital item can be defined by an element in the model called an anchor that has the role of a unique identifier for a container, an item, and a component that are a sort of layered or hierarchical digital item. Also, an atomic component provides an anchor for designating resource in the atomic level in the present invention.

[0051]   In addition, the present invention provides the choice element that functions using the element selection. The choice element is required to generate a desired item according to the status of networks and terminals. Particularly, this choice is defined so that it can be modeled in a recursive form depending on the order of selection procedure in order to prevent an unnecessary next choice process by having next selection affected by current choice (choice::=choice*selection+...). For example, assuming the price (a primary choice) and transmission rate (the secondary choice) are used as conditions of choice for any digital item. If the end user of the digital item does not agree to the primary choice (price selections), the next selection becomes unnecessary and the present model provides a mechanism to prevent such redundant choice by employing conditionally recursive form.

[0052]   The present invention provides a digital item definition model with flexibility, consistency, and compatibility required in the activities of electronic commerce environment, such as various conditions of networks and devices (or terminal) used broadly in different forms. As a result, the present invention can minimize a possible disturbance of electronic commerce activities that can be happened among Users, such as a digital item creator, provider, distributor, consumer, patent exerciser, financial service provider, commercial supervisor, etc.

[0053]   In addition, considering at maximum role relations among all the Users of the electronic commerce business models, the present invention provides an infrastructure capable of achieving compatibility with an international standard by sufficiently considering interrelation with technologies derived from the MPEG-21 standard in ISO/IEC SC29/WG11.

[0054]   In addition, the present invention is very efficient and practical, since it is applicable to any types of multimedia data by providing a media type independent digital Item definition model. In addition, the present invention is applicable to a broad field, such as Internet service, satellite communication, electronic media (DVD, PDR, PDA, etc.) related to electronic commercial transaction, mobile communication, electronic libraries, electronic photograph studios, electronic museums, etc., to be used broadly in the future.

[0055]   Although the preferred embodiment of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.